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DISJUNCTIVE CONCEPTS.

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THIS DOCUMENT QUESTIONS THE PSYCHOLOGICAL VALIDITY OF DISJUNCTIVE CONCEPTS. A DISJUNCTIVE CONCEPT IS DEFINED AS AN AGGREGATE CHARACTERIZED BY THE PRESENCE OF EITHER ONE OF SEVERAL ATTRIBUTES OR ALL OF THEM, WHERE THE DIFFERENT ATTRIBUTES DO NOT SHARE ANY ELEMENTS IN COMMON. THE AUTHOR FEELS THAT NATURAL HUMAN CATEGORIES ARE TYPICALLY NOT DISJUNCTIVE. THE DISJUNCTIVE APPEARANCE OF NATURAL CONCEPTS IS VIEWED AS THE CONSEQUENCE OF A FAILURE TO DISTINGUISH BETWEEN CUES WHICH CAN BE DISJUNCTIVE AND ATTRIBUTES WHICH ARE NOT DISJUNCTIVE. CUES ARE OBSERVABLE ASPECTS OF PHYSICAL ENTITIES AND AS SUCH ARE USEFUL IN PLACING INSTANCES IN CATEGORIES, BUT THE CATEGORIES THEMSELVES ARE DEFINED BY ABSTRACT ATTRIBUTES WHICH DO NOT NECESSARILY HAVE DIRECT PHYSICAL CORRESPONDENCES. THE AUTHOR MAINTAINS, THEREFORE, THAT HUMAN CONCEPTS MUST BE VIEWED AS POSSESSING PSYCHOLOGICAL, NOT PHYSICAL, REALITY. THIS PAPER WAS PRESENTED AT A SYMPOSIUM ON THE CONCEPT OF STRUCTURE IN LANGUAGE AND THINKING AT THE 1966 ANNUAL CONVENTION OF THE EASTERN PSYCHOLOGICAL ASSOCIATION IN NEW YORK CITY. (AUTHOR/DO)

Disjunctive Concepts?[1]

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The main purpose of this paper is to raise doubts concerning the psychological validity of disjunctive concepts (e.g., 1). A disjunctive concept is defined as an aggregate characterized by the presence of either one of several attributes or all of them, where the different attributes do not share any elements in common. An example of an experimental definition of a disjunctive concept is "a triangle, a blue figure or both." By this definition any triangle whether or not blue and any blue figure whether or not triangular would qualify for membership in the category; all other instances would be excluded. Civic and professional organizations are sometimes cited as everyday life examples of disjunctive concepts. For instance, a psychologist qualifies as a member of the EPA if he is a member of the APA or if he has had a specified number of years of experience in psychological research or practice. Another popular example is the strike in baseball which is "a pitch that is across the plate and between the batter's knees and shoulders or it is any pitch at which the batter strikes but fails to send the ball into the field."

It has been found that intelligent subjects have difficulty in attaining disjunctive concepts in the laboratory even with considerable aid from the experimenter. This finding was used as an explanation for the presumed rare occurrence of disjunctive concepts in everyday life. However, if we follow the definition and examples given of disjunctive

concepts, it would appear that a great many everyday life concepts are disjunctive. Take the concept furniture which includes objects having very diverse characteristics: some, for instance, have four legs, a flat surface, and back support, while others have shelves and doors and none of the characteristics of the first class of members. Concepts such as clothing, and vehicles would also have to be characterized as disjunctive, not to mention highly abstract concepts such as justice, love, etc. An apparent paradox thus arises between the kind of concepts humans are capable of forming in the psychological laboratory and the kind of concepts that seem to have evolved in human societies. Disjunctive concepts are hard to attain in the psychological laboratory and yet very common in everyday life.

This paradox seems to be symptomatic of a misconception about the nature of human concepts common in behavioristically oriented studies of concepts. It will be recalled that disjunctive concepts are characterized as concepts whose members are admitted on the basis of either one of several dissimilar attributes. It seems therefore proper to ask: How does one determine similarity and dissimilarity? Psychological similarity cannot be made dependent on physical similarity, for in many cases it is simply impossible to find physical similarity among stimuli conceived as belonging together. Another approach, common in psychology (e.g., 5), is to seek similarity in the person's activity vis-a-vis stimuli in his environment, i.e., to define concepts in terms of communality of responses. This functional-behavioral approach would be applicable if we had to respond first before classifying a new stimulus as a member of a particular category. But

the sequence of events is often the opposite: we first know that a particular stimulus is a piece of clothing and only afterwards put it on. It seems that psychological similarity cannot be located on the level of sensory or motor identities. How then can one characterize human concepts?

It is suggested here that useful insights into the nature of concepts and thinking in general can be derived from an examination of the structure of language, which, at present, is better understood than any other cognitive function. Language is a system and its concepts are defined in relation to each other and by their role in the system. To be sure, linguistic concepts can be coordinated with events external to the system but their primary identity derives from interaction with terms within the system. Thus the phoneme as a perceptually valid unit must be considered an abstract construct not necessarily identifiable by an invariant correspondence with acoustic properties of speech but rather by its function in the phonological system of the language. Sapir (6) made this point eloquently in 1933 in his classic article on "The psychological reality of phonemes." Drawing on his experience with American Indian languages, Sapir concluded that in order to explain the perception of a single utterance one has to understand the total phonological system of the language, for it is this system that guides the hearer in his interpretation of the individual speech signals. Sapir could explain the differential perception of the objectively similar words only by reference to their differential rendering under inflection. He saw the relevance of such observations to the characterization of human concepts in general and asserted that "no entity in human experience can be adequately defined as the mechanical sum or product of its physical properties" (p. 46).

Thus, human concepts have to be viewed as possessing psychological not physical reality.

Another early master of linguistic science, Ferdinand de Saussure (7) reflected a similar conviction about language when he declared that "language is a form not a substance" (p. 122) and that "in language there are only differences without positive terms" (p. 120).

These notions can find experimental support in the cases where sounds not sharing any common spectographic property are perceived as falling into the same phonemic category (4). For instance, /g/ followed by different vowels drastically changes its acoustic characteristics, but remains perceptually unchanged. Apparently, then, phonemic categories do not bear one-to-one correspondences with acoustic facts of speech, but rather constitute a system of abstract entities coordinated as a <u>whole</u> with the physical data of speech. Each phoneme need not have a unique manifestation in speech: different environments condition a different realization. The reason for the common percept is not a common product but a common point of origin.

The complex and distant relation between human concepts and observable properties is perhaps brought out most clearly in the generative transformational approach to language (2). Consider the categories commonly known as parts of speech. Linguists have recognized for some time the vagueness of the grammar school definitions of nouns, verbs, etc. in terms of their referents. Linguists substituted structural definitions for the referential ones. Gleason (3 , p. 94) puts it this way: "Most nouns (grammatically defined) do in fact refer to 'persons, places, and things.' This is a

useful fact to know and it is wholly accidental. Nevertheless, nouns are not nouns because of this, but because of something else which is only rather distantly connected, namely the grammatical structure of English." Transformational grammar has revealed the pervasiveness and depth of structure in language and the close dependence of each element on the total structure. Only a thorough analysis of the whole system permits one to assign correct category membership to individual words. Consider the category assignment of the words be and have. In the following two pairs of sentences: 1a. John has the book. 1b. John is a good fellow. 2a. John has borrowed the book. 2b. John was given an opportunity., the two words seem to function in like fashion: in the first pair as main verbs, and in the second as auxiliary verbs. But, as Chomsky has shown (2, pp. 61-69) an inspection of the roles of these words in other frames discloses that be is not really a main verb at all while have is. For instance, one can say "John doesn't have a book" where have functions as a main verb in the same way as read does in the sentence: "John doesn't read books," but one can't produce an analogous construction with be. Thus, "John doesn't be the president" is not a well-formed sentence. Two words may even have the same grammatical marker and yet belong to different syntactic categories, as is the case with the words sleeping and interesting. In many contexts these words appear to be functioning identically. For instance:

3a. The book was interesting. 3b. The child was sleeping.

4a. The interesting book . . . 4b. The sleeping child . . .

But their different nature is exposed by the following pair:

5a. The very interesting book . . . 5b. *The very sleeping child . . .

This comparison reveals that interesting is a true adjective while sleeping

isn't although in certain cases it functions the way adjectives do (2, pp. 73-75).

The conclusion we wish to draw from the above discussion is that linguistic categories cannot be defined in terms of the formal characteristics of their physical make up but must be analyzed by reference to their function in the total structure of the language. This structure is internal and abstract and is not to be identified with its manifestations in the observable acts of speech.

Returning now to disjunctive concepts, it seems that a failure to make the distinction between concepts and their manifestations is responsible for the paradox discussed. Concepts are defined by certain attributes; their manifestations possess cues which suggest category membership. We use cues to tell us whether a particular stimulus belongs to one or another category but the cue need not be an attribute of the category. For instance, a ring of a particular shape on a woman's third left-hand finger identifies her as married but the ring does not constitute an attribute of our concept of matrimony; it is merely an external sign of it. There are also other signs such as being called "Mrs." The signs in this case are disjunctive but the concept itself is not. The attributes of this concept, married woman, are harder to specify, but their identification certainly depends on an understanding of the complex set of family relations and norms in the culture. Similarly, a person can be identified as French by his name, speech, etc., but these features are not essential attributes of the concept Frenchman, they are merely convenient cues for placing instances in this category. Examples can be multiplied to show the difference between cues and attributes. Suffice

it here to refer to two concepts, vehicles and strike in baseball, which started our discussion. There are many different kinds of vehicles but the concept is not disjunctive because all share the common function of transportation. The different cases of strike in baseball do not make a disjunctive concept because they all reflect an underlying lapse in skill: they are all a result of a common cause. But what common underlying basis do blue and triangle have? We are forced to conclude that disjunctive concepts are an artifact of the psychological laboratory--resulting from mistaking cues for attributes--and have little to do with natural human concepts. Using Egan Brunswik's terminology one could say that disjunctive concepts lack ecological validity.

In conclusion, it is essential to distinguish between what a person knows about concepts and how he recognizes their members. Much psychological research has failed to make this distinction and concerned itself with the study of cues for identifying instances of concepts rather than with concepts themselves. A study of the nature of concepts and their attributes along the lines suggested by linguistic analysis may not only enrich our understanding of cognitive processes but also clarify to what extent the mental processes involved in language are typical of cognitive functions in general.

SUMMARY

This article questions the ecological validity of such laboratory concepts as "a blue figure and a triangle of any color." It is argued that natural human categories are typically not disjunctive. The disjunctive appearance of natural concepts is viewed as the consequence of a failure to distinguish between cues which can be disjunctive and attributes which are

not disjunctive. Cues are observable aspects of physical entities and as such are useful in placing instances in categories, but the categories themselves are defined by abstract attributes which do not necessarily have direct physical correspondences. Human concepts must be viewed as possessing psychological, not physical, reality.

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Footnote

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